

CLAIMS

1. A method of dispensing liquid on a part of a substrate for cleaning or etching of the substrate, while  
5 another part of said substrate is prevented from contacting said liquid, said method comprising the steps of:

supplying a liquid on a part of said substrate; and

- simultaneously with said step of supplying a  
10 liquid, supplying a gaseous tensio-active substance to a surface, said gaseous substance being at least partially miscible with said liquid and when mixed with said liquid yielding a mixture having a surface tension lower than that of said liquid.

- 15 2. A method according to claim 1,  
wherein said substrate is circular shaped,  
wherein the step of supplying a liquid on a part of said substrate includes supplying at least one stream of a liquid so that said stream hits a flat surface  
20 of said substrate in an area of said surface, said area being adjacent to an outer rim of said substrate,

- wherein the step of supplying a gaseous tensio-active substance to said surface includes supplying at least one stream of a gaseous tensio-active substance to  
25 the flat surface of said substrate so that said stream hits said surface in an area which is adjacent to the area hit by said liquid stream, and closer to the center of rotation, and

- further comprising the step of:  
30 rotating the circular shaped substrate about an axis of rotation, the axis being perpendicular to the substrate surface and through a center of gravity said substrate.

3. A method according to claim 2, wherein the rotational movement is in the horizontal plane.

4. A method according to claim 1,  
wherein said substrate is circular shaped and  
5 further comprising the step of rotating the circular shaped substrate about an axis of rotation, the axis being perpendicular to the substrate surface and through a center of gravity of said substrate,

wherein the step of supplying a liquid on a  
10 part of said substrate includes supplying at least one stream of the liquid so that said stream hits an outer rim of said substrate, and

wherein the step of supplying a gaseous tensio-active substance to said surface includes supplying  
15 at least one stream of a gaseous tensio-active substance to an edge area of a flat surface of said substrate, said area being adjacent to the area of the rim onto which said liquid stream is supplied.

5. A method according to claim 4, wherein the  
20 rotational movement is in the horizontal plane.

6. A method according to claim 2, wherein the substrate has two sides, a first side which includes the outer rim area and a second side, and further comprising the step of:

25 supplying an additional stream of liquid to at least a portion of the second side.

7. A method according to claim 6, wherein the step of supplying an additional stream of liquid includes supplying liquid to the entire second side.

30 8. A method according to claim 1, wherein the substrate is circular shaped and has two sides, a first side consisting of an annular edge area and a central area,  
further comprising the step of holding the circular shaped substrate,

wherein the step of supplying a liquid on a part of said substrate includes supplying a stream of liquid to the entire annular edge area of the first side of the substrate, and

- 5                wherein the step of supplying a stream of a gaseous tensio-active substance includes supplying a stream of a gaseous tensio-active substance to the central area of the surface.

9. A method according to claim 8, further  
10 comprising the step of subjecting the substrate to a rotational movement with an axis of rotation being perpendicular to the substrate surface and through a center of gravity of said substrate.

10. A method according to claim 8, wherein  
15 the substrate has two sides, a first side which includes the outer rim area and a second side, and further comprising the step of:

supplying an additional stream of liquid the entire second side.

- 20                11. A method according to claim 1, wherein the substrate is circular shaped,

- wherein the step of supplying a gaseous  
tensio-active substance to said surface includes supplying  
streams of a gaseous tensio-active substance to border  
25 areas between said liquid and said flat surfaces,

wherein said liquid is selected from the group consisting of an etching liquid, a cleaning liquid and a rinsing liquid; and

- further comprising the steps of:  
30 holding the circular shaped substrate, and  
providing a means of bringing an annular edge area of both flat surfaces of said substrate, and the outer rim of said substrate into contact with an amount of liquid.

12. A method according to claim 11, wherein said etching liquid is a dilute aqueous solution,

wherein said cleaning liquid is selected from the group consisting of a mixture of  $\text{NH}_4\text{OH}$ ,  $\text{H}_2\text{O}_2$ , and  $\text{H}_2\text{O}$ ;  
 5 a mixture of  $\text{HCL}$ ,  $\text{H}_2\text{O}_2$  and  $\text{H}_2\text{O}$ ; diluted  $\text{HCL}$ ; and a mixture comprising  $\text{O}_3$ , and

wherein said rinsing liquid is selected from the group consisting of  $\text{H}_2\text{O}$ ; and a mixture of  $\text{H}_2\text{O}$  and an acid, said acid mixture having a pH between 2 and 6.

10 13. A method according to claim 11, wherein the step of holding the circular shaped substrate includes holding the circular shaped substrate in a horizontal plane.

14. A method according to claim 11, further  
 15 comprising the step of subjecting the substrate to a rotational movement, the axis of rotation being perpendicular to the substrate surface and through a center of said substrate.

15. A method according to claim 1, wherein  
 20 the substrate has two sides, a first side and a second side,

further comprising the step of placing the second side of the substrate on a flat, rotating surface, said rotating surface containing an annular channel, so  
 25 that said second side of said substrate is covering said channel,

wherein said step of supplying a gaseous tensio-active substance includes supplying a stream of gaseous tensio-active substance through said annular  
 30 channel and in the direction of said substrate, so that said substrate is held on said rotating surface by a Bernoulli effect, and

wherein said step of supplying a liquid on a part of said substrate includes supplying a stream of the liquid on the first side of said substrate.

16. A method according to claim 1, wherein  
5 the substrate has a first side and a second side,

wherein the step of supplying a liquid on a part of said substrate includes supplying, through a first channel, a continuous stream of liquid to a part of the first side of the substrate,

10 further comprising the step of draining said stream of liquid from said first side through a second channel, the second channel being concentrically placed around the first channel,

and wherein the step of supplying a gaseous  
15 tensio-active substance includes supplying to said first side a stream of a gaseous tensio-active substance around said second channel, to prevent remainder liquid from making contact with the first side of the substrate which is not contained within the second channel.

20 17. The method according to claim 16, wherein the substrate is placed in a horizontal position.

18. The method according to claim 16, wherein the gaseous tensio-active substance is drained from said substrate through an additional channel.

25 19. A method according to claim 1, wherein the step of supplying a liquid on a part of said substrate includes bringing an amount of liquid into contact with a part of a flat surface, and

wherein the step of supplying a gaseous  
30 tensio-active substance to said surface includes supplying to said surface a stream of gaseous tensio-active substance around said amount of liquid, thereby preventing said liquid from making contact with the rest of said surface.

20. The method according to claim 19 wherein the substrate is placed in a horizontal position.

21. The method according to claim 19, further comprising the step of draining said gaseous tensio-active  
5 substance from the substrate through an additional channel.

22. An apparatus for subjecting a substrate to a localized liquid treatment for cleaning or etching of the substrate, said apparatus comprising:

means for holding said substrate,

10 a first supply system adapted to supply a liquid on a first part of the surface of said substrate, and

a second supply system adapted to supply a gaseous substance to a second part of said substrate, the  
15 second part of the substrate adjacent to the first part which is treated by said liquid.

23. An apparatus according to claim 22, further comprising a rotational device wherein said rotational devices rotates the substrate around an axis  
20 which is perpendicular to said substrate, the axis being through a geometric center of said substrate.

24. An apparatus according to claim 23, wherein the substrate is circular shaped and has a first side and a second side, the first side having an annular  
25 edge area,

wherein the first supply system includes at least one nozzle adapted to supply a stream of liquid on the annular edge area of said substrate;

wherein the second supply system includes at  
30 least one nozzle adapted to dispense a gaseous tensio-active substance on an area of said first side adjacent to said annular edge area, the area of said first side being closer to the center of the substrate than the annular edge area; and

wherein the at least one nozzles of the first and second supply systems supply a contiguous stream of fluid.

25. An apparatus according to claim 24,  
5 wherein the substrate is horizontally placed.

26. An apparatus according to claim 24,  
wherein the at least one nozzles of the first and second supply systems are positionable on any location along a fixed radius of said substrate.

10 27. An apparatus according to claim 24,  
further comprising a nozzle adapted to direct a stream of a treatment liquid onto the entire second side of said substrate.

28. An apparatus according to claim 22,  
15 wherein the substrate has a geometric center, an axis which is perpendicular to said substrate at the geometric center of said substrate, a central part around the axis of the substrate and an annular edge,

wherein said first supply system includes a  
20 first annular channel adapted to supply the liquid to the entire annular edge area of the surface of said substrate,

wherein said second supply system includes a central channel adapted to supply a gaseous substance to the central part of said substrate, the central channel  
25 being coaxial with the axis of the substrate, and

wherein said second supply system further includes a second annular channel placed concentrically with respect to the first channel and closer to the geometric center of said substrate, said second channel  
30 adapted to guide the gaseous substance coming from the central part of said substrate, in order to prevent said liquid from touching said central part.

29. An apparatus according to claim 23, wherein the substrate has a central part around the axis of the substrate and an annular edge,

wherein said first supply system includes a  
5 first annular channel adapted to supply the liquid to the entire annular edge area of the surface of said substrate,

wherein said second supply system includes a central channel adapted to supply a gaseous substance to the central part of said substrate, the central channel  
10 being coaxial with the axis of the substrate, and

wherein said second supply system further includes a second annular channel placed concentrically with respect to the first channel and closer to the geometric center of said substrate, said second channel  
15 adapted to guide the gaseous substance coming from the central part of said substrate, in order to prevent said liquid from touching said central part.

30. An apparatus according to claim 28, further comprising a rotational device, wherein the  
20 rotational device rotates the apparatus around an axis which is perpendicular to said substrate and which is through the geometric center of said substrate.

31. An apparatus according to claim 28, wherein the substrate has a first side and a  
25 second side, and

further comprising a nozzle adapted to dispense a stream of a treatment liquid on the entire second side.

32. An apparatus according to claim 28, further comprising a sealing device positioned between said  
30 substrate and an outer wall of said second annular channel.

33. An apparatus according to claim 22, wherein the substrate is circular shaped and has two sides

with an annular edge and an outer rim, and further comprising:

a container filled with an amount of treatment liquid so that a pressure is maintained above the surface of said amount of treatment liquid, said pressure being less than or equal to an ambient pressure, said container having a narrow gap in one side, into which said circular substrate is partially inserted, so that at least a portion of said annular edge and said outer rim of said substrate is immersed in said liquid,

at least one pair of nozzles, one nozzle of said pair on each side of said substrate, directing a stream of a gaseous substance at a border area between said container and said substrate.

15 34. An apparatus according to claim 23, wherein the substrate is circular shaped and has two sides with an annular edge and an outer rim, and further comprising:

a container filled with an amount of treatment liquid so that a pressure is maintained above the surface of said amount of treatment liquid, said pressure being less than or equal to an ambient pressure, said container having a narrow gap in one side, into which said circular substrate is partially inserted, so that at least a portion of said annular edge and said outer rim of said substrate is immersed in said liquid,

at least one pair of nozzles, one nozzle of said pair on each side of said substrate, directing a stream of a gaseous substance at a border area between said container and said substrate.

35. An apparatus according to claim 33, wherein the substrate is positioned in a horizontal plane

36. An apparatus according to claim 33, further comprising a rotational device, the rotational

device rotating the container around an axis which is perpendicular to said substrate, the axis being through a geometric center of said substrate.

37. An apparatus according to claim 22,  
5 wherein said first supply system includes a central channel used to supply a stream of liquid to the surface of said substrate and a second channel, concentrically surrounding the first channel, and draining said stream of liquid from the surface of said substrate; and

10 wherein said second supply system includes a third channel, concentrically surrounding the second channel and used to supply a stream of a tensio-active substance to the substrate surface.

38. An apparatus according to claim 37,  
15 wherein the substrate is positioned in a horizontal plane.

39. An apparatus according to claim 37,  
wherein the second supply system further comprises a fourth channel, the fourth channel being concentrically placed with respect to said third channel, the fourth channel  
20 being used to drain said gaseous tensio-active substance from the substrate surface.

40. An apparatus according to claims 37,  
further comprising a sealing device, the sealing device positioned between said substrate and an outer wall of said  
25 second channel.

41. An apparatus according to claim 39  
further comprising sealing devices, the sealing devices positioned between said substrate and an outer wall of said second channel and between said substrate and an outer wall  
30 of the apparatus.

42. An apparatus according to claim 41  
wherein the outer wall of the apparatus is an outer wall of the fourth channel.

43. An apparatus according to claim 41 wherein the outer wall of the apparatus is an outer wall of the third channel.

5 44. An apparatus according to claim 22, wherein the first supply system includes a central channel; the central channel containing an amount of a liquid such that said liquid is in contact with the surface of said substrate, and that a pressure is maintained above a surface of said amount of liquid, said  
10 pressure being less than or equal to an ambient pressure on the substrate surface, and

wherein said second supply system includes a second channel, the second channel concentrically surrounding the central channel, and supplying a stream of  
15 a gaseous tensio-active substance on the surface of said substrate.

45. An apparatus according to claim 44, wherein the substrate is positioned in a horizontal plane.

46. An apparatus according to claim 44,  
20 wherein the second supply system further comprises a third channel, the third channel concentric with respect to the second channel, the third channel being used to drain said gaseous tensio-active substance from the substrate surface.

47. An apparatus according to claim 44,  
25 further comprising a sealing device, the sealing device positioned between the substrate and an outer wall of the central channel.

48. An apparatus according to claim 46, further comprising sealing devices, the sealing devices  
30 being positioned between the substrate and an outer wall of the central channel and between the substrate and an outer wall of the third channel.